COMMENTS ON EPA'S PROPOSED RULE REVISIONS

Prevention of Significant Deterioration New Source Review: Refinement of Increment Modeling Procedures

This document contains the comments of the State of North Dakota, North Dakota Department of Health (hereafter Department, we or our) on EPA's proposed refinements to the CAA New Source Review Program and the program's Prevention of Significant Deterioration Measures. These comments supplement comments in the letter to which this document is attached.

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The Department appreciates the preamble's analyses of several air quality modeling issues. We approve the flexibility and professional judgement standard for emission inventories that is included in these rule changes. Appropriate pollutant emission inventories and facility-specific and site-specific (e.g., meteorology and terrain) issues can only be resolved by exercising judgement on technical and fact-specific questions.

The Department quotes several paragraphs of the preamble's issue analyses as a pathway of direction for its technical comments, which relate primarily to CAA PSD class I area modeling experiences in recent years. Our comments are meant to draw attention to facts, that in our experience, relate directly to or expand preamble discussion regarding data inputs, such as emissions and meteorology, for air quality modeling and the role of modeled concentrations and ambient monitored concentrations in air quality management.

The Department completed a CAA PSD periodic review pursuant to a Memorandum of Understanding between EPA and the State of North Dakota (see your docket document number EPA-HQ-OAR-2006-0888-0012). This periodic review is one of the first, if not the first, review to be completed pursuant to the CAA PSD Program since its inception in 1977. The Department's final report and the Department's docket of hearing proceedings were provided to EPA; only the final report, including several addendum and hearing findings, are included in EPA's docket EPA-HQ-QAR-2006-0888.

The Department also prepared a detailed report addressing technical issues recurring during and subsequent to its periodic review hearings' proceedings. This additional document is titled *Responses to Recurring Issues Related to North Dakota's Computer Modeling of Sulfur Dioxide in CAA PSD Class I Areas* (hereafter *Responses to Recurring Issues*). Some, if not many, of these recurring issues are likely to appear in comments by others on your proposed refinements to increment modeling procedures. A copy of this document is attached.

72 FR 31379, § IV: "Proposed Clarification Regarding the Effect of the Draft New Source Review Workshop Manual"

National or regional consistency expressed in EPA's guidance or prompted by modeling conferences and workshops to foster a common approach among modeling practitioners in air quality modeling can be a place where modeling starts, rather than where it rests, to accommodate unique features of individual air quality modeling assessments. See, for example, Appendix W to 40 CFR Part 51 at §§ 1.a, 1.c, 1.d, 1.e and 8.0.a as well as CAA § 165(e)(3).

Furthermore, emphasis on national or regional consistency by oversight reviewers can distract users of guidance from investigating and understanding the sensitivity of model output to input data uncertainty (see section 3.8 in *Responses to Recurring Issues*). For example, see our comments regarding (1) modeling rule-defined actual emissions as an average during operating hours under sections V.B.1 and V.B.3 and (2) blending of meteorological observations with prognostic meteorological data under section V.C.1 in this document. In sum, the understandings of model performance by experienced modelers do not always transpose to other air quality modeling assessments.

The preamble states:

> "We propose in this action to make clear that the draft NSR Manual is not a binding regulation and does not by itself establish final EPA policy or authoritative interpretations of EPA regulations under the New Source Review Program."
>
> "[W]e recognize that some of the views expressed in the draft NSR Manual may have been promulgated in EPA regulations or adopted by the Agency as final policy statements or interpretations in other actions taken before or after the release of the draft NSR Manual in 1990. ... To the extent such policies or interpretations are reflected in other action or documents that were issued in final form ..., EPA will continue to follow them unless the Agency has otherwise indicated that it no longer adheres to such policies or interpretations."

During the 1970s, 1980s and 1990s, EPA provided many opinions in letters, memoranda, and policies on modeling issues; about 1,400 of these document were distributed (available at http://cfpub.epa.gov/oarweb/MCHISRS/). The first *Guideline on Air Quality Models* was published in 1978; this guidance has not addressed modeling for PSD increment consumption. The first PSD workshop manual was published in 1980; this manual did address increment consumption. The 1990 draft NSR Workshop Manual, which also addresses increment consumption, was written at a time when long-range transport and dispersion modeling was not commonly used in air quality assessments. Letters, policies and guidelines were summarized in a 1994 document titled *SO_2 Guideline Document* (EPA-452/R-94-008). And recently, EPA released its *Guidance on the Use of Models and other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze*, which is your docket document number EPA-HQ-OAR-2006-0888-0009. We suggest that EPA clarify with references to documentation all aspects of air quality modeling guidance that has been resolved in final form.

Continuing, the preamble also states:

> "We request comment on this proposal to clarify that the draft NSR Manual is not a binding regulation and does not independently reflect or establish a final statement of EPA policy or an authoritative interpretation of EPA regulations."

We support the proposed action to make clear that the draft NSR manual is not binding and does not by itself establish policy or authoritative interpretations of regulations. For example, the draft NSR manual does not encourage calculation of rule-defined "baseline concentration" (see draft NSR manual at page C.10), which is not consistent with August 1980 preamble to adopted revisions of PSD regulations (see your preamble at II.D).

No new or modified regulation is proposed.

72 FR 31380, § V.A: "What kind of emissions consume or expand the PSD increment?"

The definition for "baseline concentration" at 40 CFR 51.166(b)(13) describes emissions that are included or not included; exclusions from increment consumption are also listed at 40 CFR 51.166(f)(2).

72 FR 31380, § V.A.1: "What types of sources are included in increment consumption modeling?"

The preamble states:

> "[W]e understand that many States have not consistently accounted for mobile source emissions in their increment analyses. To make clear that mobile source emissions need to be included in an analysis of increment consumption, we are proposing to amend the reference to "any stationary source" in 40 CFR 51.166.(b)(13)(ii)(b) ... of our regulations to make explicit that actual emissions increases or decreases that consume or expand increment are not limited solely to stationary source emissions.

> ... [S]tates should simply include mobile source emissions in their next permit review or periodic review of increment consumption and factor those results into future permitting decisions or planning strategies."

We accept your clarification that inclusion of mobile sources in increment consumption will no longer be optional but required. Mobile sources were not included in North Dakota's SIP PSD periodic review; if your proposal is promulgated, these emissions would have to be considered in future increment consumption analyses. Inclusion of mobile sources adds another data input uncertainty.

Continuing, the preamble states:

> "The existing regulations also specify that "secondary emissions" are to be included in an increment analysis. See 40 CFR 51.166(k) ... Secondary emissions are defined as emissions which occur as a result of the construction or operations of a major source or modification, but do not come from the major source itself. ... Secondary emissions must be specific, well defined, quantifiable, and impact the same general area as the major source or modification under review."
>
> "We have also codified an exemption to these general principles in 40 CFR 51.166(f) of the PSD regulations. This provision [also] authorizes SIPs to exclude from increment consumption those sources in the four categories listed in section 163(c) of the Act. The regulations also allow States to exclude concentrations attributable to temporary increases in emissions from sources affected by SIP revisions approved by EPA. See 40 CFR 51.166(f)(1)(v)." (Note – the correct citation is 40 CFR 51.166(f)(2)(e).)

The reasons for the preamble's discussion regarding secondary emissions and emissions excluded from increment consumption are unclear.

EPA did not mention a specific focus for comments on these issues.

72 FR 31381, § V.A.2: "How is a source with a Class I area Federal Land Manager variance treated in subsequent increment consumption modeling?"

This issue is discussed in the cover letter to these comments. Note – the issue is proposed as 40 CFR 51.166(f)(2)(i)(f).

Generally, we concur with the interpretations of the CAA expressed in the preamble on page 31382, column 3. But we note that: (1) a modeling assessment of increment consumption involves inventories of current-time emissions and PSD baseline emissions, which when subtracted yield changes in sources' emissions after a major source baseline date that are often referred to as increment-affecting emissions; and (2) a modeling assessment of impact on AQRVs involves an inventory of sources' current-time emissions. Therefore, uncertainty in baseline emission inventories is not a factor in AQRV modeling assessments The preamble's discussion in section V.A.2 seems to omit this important distinction.

72 FR 31384, § V.B: "How are emissions estimated for sources that consume increment?"

Some commentors may challenge your proposed policy that emissions data for modeling for increment consumption should be reliable, consistent and representative, your proposal that annual averages can be used in modeling increment consumption where data are unreliable to determine short-term emissions, or your observation that emissions data for increment consumption can be less precise than data for modeling to demonstrate NAAQS compliance or to assess AQRV impacts, which are based on total monitored or modeled concentrations due to current-time and new source emissions. In the end however, error and bias in modeled concentrations reflect uncertainty in all data inputs, not just emissions, and the accuracy of model algorithms. The increments are numbers that are not related to human health and welfare, and the class I increments are thresholds which establish whether FLMs or sources have the burden of conducting AQRV assessments. AQRV assessments are optional, not mandatory, actions of FLMs or sources (see, for example, your preamble section V.A.2).

We also observe that input data uncertainty is not treated as creating a range of possible modeling outcomes, but rather handled by seeking the worst-case outcome. The available techniques to bridge from input data uncertainty to dispersion model outcome inaccuracy are to test the sensitivity of modeled concentrations using various inputs and to compare modeled concentrations to monitored concentrations. For example, see sections 3.6 and 3.8 and Parts 4 and 5 in *Responses to Recurring Issues*.

The preamble states:

> "The definition for "actual emissions" in 40 CFR 51.166(b)(21) "is expressly incorporated into the definition of "baseline concentration" which establishes the basic parameters ... for determining the change in concentration since the baseline date. In this action, we are proposing to adopt a revised definition of "actual emissions" that will address the methodology for quantifying emissions as of the baseline date and emissions that consume increment. Rather than revising the existing definition ..., we propose to promulgate a new definition of "actual emissions" in 40 CFR 51.166(f) ... that will apply only to the analysis of increment consumption ..." (Note – the proposed new definition actually is at 40 CFR 51.166(f)(1).)
>
> "We also request comment on whether we could also repeal the existing definition ... without affecting other elements of the PSD program."

In our experience, repealing the existing definition for actual emissions would not affect other, non-increment-consuming, NSR modeling, because the provisions of the existing definition are contained in the proposed new definition. However, there may be circumstances in our CAA PSD permitting actions, which are unknown at this time, that may be affected by repealing the existing definition for actual emissions; therefore, we prefer that EPA retain the existing definition.

72 FR 31385, § V.B.1: "Data and Calculation Methods Used to Establish Actual Emissions"

In our experience, guidance, in general, creates a burden of rebuttal when the guidance does not fit problem circumstances or otherwise distracts from appropriate practical approaches and fundamental science disciplines. For example, the Department's 1999 draft modeling and EPA Region 8's 2002-03 draft modeling (which used peak or surrogate peak (i.e., 90th percentile) rates, respectively) produced absurd results suggesting sulfur dioxide 24-hour increment consumption was double actual ambient 24-hour concentrations (see, for example, section 8.8 in *Responses to Recurring Issues*). The reasons for this outcome are complex, but two reasons are that (1) modeled emission input rates were time constant, rather than time variable such as hourly CEM emissions, and (2) electrical generating units do not concurrently (i.e., hour by hour) emit at higher and lower rates (see sections 4.6, 6.4 and 8.8 and Appendix B in *Responses to Recurring Issues*), which causes the sum of source peak rates to exceed almost all, if not all, hourly sums of all sources' hourly CEM emissions (see figure A4 in *Responses to Recurring Issues*) regardless of wind direction (see section 4.3 in *Responses to Recurring Issues*).

The preamble states:

> "We propose to add language to the PSD regulations to clarify that a reviewing authority has discretion to use its best professional judgment when determining the actual emissions of sources as of the baseline date and at subsequent periods of time, particularly where there is limited data available from which to determine actual emissions. We propose to establish a general standard for sufficiency of data and calculation methods on which actual emissions may be based, but also request comment on WESTAR's recommendation that EPA establish a menu of permissible data types and calculation methods ..."

Our impression regarding the words actual emissions in some EPA preambles, guidance and other documents has been that these words have generally had the meaning actual emitted pollutants without clarification as to circumstances when rule-defined "actual emissions" applied.

Continuing, the preamble states:

> "Other than the language ... from the definition of "actual emissions" ..., the PSD regulations have not included any criteria for reviewing authorities to use to determine actual emissions. We have provided more specific guidance ... in table 8-2 of appendix W, but this table was not developed for purposes of increment consumption analysis. ... We no not believe our recommendations in Table 8-2 can be readily extended to increment consumption analyses because of differences in increment consumption analysis. Unlike the NAAQS analysis, increment consumption assessments have generally focused on changes in emissions, rather

> than absolute concentrations, and often must account for emissions that occurred many years earlier on the applicable baseline date."

In addition, we observe that Appendix W does not mention or discuss rule-defined "baseline concentration" or "actual emissions".

Continuing, the preamble states:

> "To address the uncertainty in how to determine actual emissions for increment consumption purposes, we propose to codify a policy that gives the reviewing authority discretion to select the data and emissions calculation methodologies that are reliable, consistent, and representative of actual emissions. The cornerstone of such a policy is that emissions estimates used to establish baseline concentrations and increment consumption or expansion must be supported by the available record and be rationally-based."
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> "We propose to give each reviewing authority the responsibility to verify and approve the data used, and to assure that it meets a basic standard of reliability, consistency, and representativeness. ... [W]e propose to make clear that this standard will control over the recommendations in appendix W." (Note – the preamble doesn't mention that this appendix W issue is included under the proposed new definition for "actual emissions" at 40 CFR 51.166(f)(1)(vii).)
>
> "We request comment on this policy, and on the regulatory language proposed at 40 CFR 51.166(f)(1)(iv) ... to codify this policy.

We agree with the rationale for, and we support, the proposed policy and standard. The criteria of the standard, namely "reliable, consistent, and representative", might have different connotations in different modeling circumstances. For example, consistency is two dimensional – between the two time lines, PSD baseline period and current period, and between sources (see, for example, Part 4 in *Responses to Recurring Issues*). And representative also has two dimensions – representative of "normal" emissions and representative of actual concentrations (see, for example, sections 6.5 and 7.2 in *Responses to Recurring Issues*). The criteria could be mutually exclusive rather than inclusive, so that discretion can be clearly articulated. The criteria should not be rule-defined, unless broad discretion is provided.

Continuing, the preamble also states:

> "In addition, we request comment on whether additional guidance or limitations should be articulated and codified for estimating emissions that make up the baseline concentrations or consume increment." (Note – the proposed policy is actually under the proposed new definition for "actual emissions" at 40 CFR 51.166(f)(1)(i).)

The consistency criterion should not include the historical emphasis on national or regional consistency in application of models, but rather should reflect the flexibility expressed in Appendix

W to 40 CFR Part 51 at §§ 1.a, 1.c, 1.d, 1.e and 8.0.a as well as CAA § 165(e)(3). For example, Region 8 acknowledged in its draft 2002-03 modeling for increment consumption in North Dakota that use of IWAQM recommended settings or values for all Calmet and Calpuff control-file variables would cause unreasonable modeled results (see section 3.8 in *Responses to Recurring Issues*).

Some sources or source categories may have inconsequential impacts on modeled concentrations. For example, we did not include the sulfur dioxide emissions of oil and gas flares and treaters at distances greater than 50 km from class I areas in our periodic review modeling (see sections 4.8 and 8.5 in *Responses to Recurring Issues* and Appendix F (page 52), Addendum B to ND's *SO2 PSD Air Quality Modeling Report*, which are your docket document numbers EPA-HQ-OAR-2006-0888-0011.13 and 0011.1, respectively). We recommend that the proposed new definition for actual emissions allow an exclusion of emissions of sources or source categories that have or are expected to have an inconsequential impact on increment consumption and AQRVs.

The preamble also requested comments on WESTAR's list of guiding principles. The proposed standard that emissions data used in increment modeling are reliable, consistent and representative is an appropriate alternative that is comparable to WESTAR's guiding principles. For example, consistency is emphasized in WESTAR's principles 3 and 5, reliable in principle 4 and representative in principles 1 and 6.

72 FR 31386, § V.B.2: "Time Period of Emissions Used to Model Pollutant Concentrations"

The preamble states:

> "In this action, we are also proposing amendments to clarify the time periods to be used for emissions from sources included in the calculation of the baseline concentration and the change in concentration after the baseline date. In general, we have called for the modeling change in concentration to be based on the emissions rates from increment consuming sources over the 2 years immediately preceding a particulate date. However, there are circumstances when another period may be more representative of actual emissions as of a particular date. This rulemaking is intended to clarify those circumstances when it is permissible to use another period ... for purposes of calculating the change in concentration used to evaluate consumption of PSD increment."
>
> "Prior to 2002, the definition of "actual emissions" in 40 CFR 51.166(b)(21) ... applied to determine the actual emissions of the [physical] change and after the change. In 2002, we adopted a new definition of "baseline actual emissions" that is now used to determine actual emissions before a [physical] change for purposes of determining whether a source is proposing a major modification that requires a preconstruction permit. ... We adopted this new definition to reflect the emission levels that occur during a normal business cycle ... See 67 FR 80191-92. However, in that rulemaking, we made clear that original "actual emissions" definition continues to apply for other purposes under the PSD program ... such as determining

a source's ambient impact against the PSD increments ... See 67 FR 80192, footnote 13; 67 FR 80196"

> "We are proposing to establish a new definition of "actual emissions" (applicable only to the increment consumption analysis) which clarifies the circumstances when it is permissible, in the context of an increment consumption analysis, to determine actual emissions for increment consuming sources using a period of time other than the 2 years immediately preceding the relevant date. We propose to codify the element of the new definition in 40 CFR 51.166(f)(1)(iv) ..."

We agree with the proposed new definition for "actual emissions" for the following reasons: (1) allows an equitable and consistent treatment of inventoried sources constructed before and after the major source baseline date (see, for example, section 4.4 in *Responses to Recurring Issues*); (2) the increments are not health and welfare based standards; (3) the increments are arbitrary, numeric numbers which are not triggers for AQRV assessments, since these assessments are optional actions by FLMs or by sources (see preamble section V.A.2); (4) impact assessments on AQRVs relate to current emissions and do not include PSD baseline (at the time of the major source baseline date) emissions; (5) exceedances of increments, except as provided by the CAA, prompt strategic action in air quality management; and (6) the uncertainty and accuracy of model predicted or estimated concentrations is typically unknown. However, we suggest that the word "unit" reflect mobile and area source categories in addition to stationary sources.

Continuing, the preamble also states:

> "Our proposed definition of "actual emissions" for the increment consumption analysis is intended to apply to both sides [PSD baseline period and present-day period] of the ledger in order to provide consistency. We believe the same principles should apply when determining emissions as of the baseline date and the present day."

We concur that a proposed new definition of "actual emissions" for use in increment consumption analyses should apply to determining emissions as of the baseline date and the present day - whether determining "normal operations" or determining rates (per preamble sections V.B.1 and V.B.3). Without consistency on both sides of the ledger, analyses and interpretation of input data uncertainty on error and bias in model predicted concentrations becomes convoluted, because, for example, bias in modeled concentrations for increment consumption does not cancel (see Appendix B, Addendum B to ND's *SO2 PSD Air Quality Modeling Report*).

EPA did not mention a specific focus for comments on this issue. [1]

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[1] The preamble in section V.B.2 also states: "Our proposed approach should not be construed to allow emissions estimates as of the baseline date to be based on operations over the entire life of a source or a period of operations that is not representative of operations as of a particular date ... Our intent is to revise the regulation to codify the approach reflected in our Memorandum of Understanding with North Dakota which calls for using the sulfur content of coal consumed during a unit's baseline normal source

72 FR 31389, § V.B.3: "Actual Emission Rates Used to Model Short-Term Increment Compliance"

We understand that, in general, modeling for the largest and highest concentrations, or changes in concentrations, would use representations of peak (e.g., maximum or 90th percentile) emission rates. Our periodic review modeling followed the current rule definition for actual emissions (see section 4.2 in *Responses to Recurring Issues*). However, criticism of our modeling contains an implicit presumption that models are robust and that use of annually averaged emission rates, rather than peak short-term rates, will cause model under-estimated 24-hour or 3-hour concentrations (see, for example, sections 3.9(3) and 4.3 in *Responses to Recurring Issues*). We tested this presumption; results indicated that use of annually averaged emission rates for sulfur dioxide did not under-estimate, but instead over-estimated, actual concentrations (see Part 5 in *Responses to Recurring Issues*). This and other presumptions in modeling protocols must be acknowledged, and flexibility allowed to rebut them. If flexibility in model emissions inputs is constrained (e.g., use of peak short-term emissions as input when modeling the largest and worst-case short-term concentrations), then flexibility to use bias in modeled concentrations determined from ambient monitoring data where available for correcting the modeled concentrations is necessary (see, for example, recommendations following paragraphs S4 on pages xiv-xvii and section 5.6 in *Responses to Recurring Issues*).

Ironically, those who advocate using maximum or peak short-term (e.g., 24-hour) emission rates to model the largest or highest short-term changes in concentrations (for assessing PSD increment consumption) apparently fail to appreciate that maximum short-term rates are constrained by production capacities of industrial processes (see section 4.6 of *Responses to Recurring Issues*). So the spread between maximum short-term rates occurring during current time and PSD baseline can be smaller than the spread between annual averaged rates (during operating hours) in circumstances where peak production occurred sometime during both time lines but average production increased after baseline. This scenario commonly occurs for electric generating units.

The preamble states:

> "We also propose in this rule to clarify how one should derive source emission rates of less than 1 year for sources contributing to the baseline concentration and increment consumption when evaluating compliance with the short-term (24-hour and 3-hour) increments for PM and SO2."

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operations, rather than the sulfur content averaged over the entire life of a mine or any period of operations in the life of the source that is not representative of operations on a particular date." The State of North Dakota and the North Dakota Department of Health initiated a proposal to EPA during oral negotiation of the MOU to change the period representing the sulfur content in coal as reflected in the MOU per paragraph 10.1 of the State Health Officer's Findings and Conclusions dated September 8, 2003, relating to a public hearing held June 12 and 13, 2003. (See Addendum E to *North Dakota's SO2 PSD Air Quality Modeling Report*.)

> "In draft guidance prepared in 1990, we recommended that sources and reviewing authorities use the "maximum actual emissions rate" for short-term averaging periods. See draft NSR Manual at C.49. ... We recommended using the maximum rate for both the current and the baseline time periods. ... In practice, however, we have since come to recognize that there is often not sufficient data available to determine maximum short-term emissions rate over a 2-year period."
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> "We propose to promulgate a new definition of "actual emissions" applicable to the PSD increment analysis that specifically addresses how to derive short-term emission rates when modeling the change in concentration for the 24-hour and 3-hour averaging periods ... We propose to add a provision that allows permitting authorities to use their discretion to use data that promotes consistency in the analysis and does not bias the analysis in favor of one group of sources over another. ... Maximum short-term-rates may continue to be used where sufficient data are available, but need not be used in all circumstances. ... A more representative indication of the change in emissions is produced by using a consistent set of data. ... At the same time, we are not proposing to preclude reviewing authorities from mixing data of different types where they consider it appropriate and this technique produces a representative analysis."

(Note – the preamble doesn't mention that this issue is included under the proposed new definition for "actual emissions" as 40 CFR 51.166(f)(1)(iii).)

We agree with the proposed new definition for "actual emissions" for the following reasons: (1) the increments are not health and welfare based standards; (2) the increments are arbitrary, numeric numbers which are not triggers for AQRV assessments, since these assessments are optional actions by FLMs or by sources (see preamble section V.A.2); (3) exceedances of increments, except as provided by the CAA, prompt strategic action in air quality management; (4) impact assessments on AQRVs relate to current emissions and do not include PSD baseline (at the time of the major source baseline date) emissions; (5) current emissions data typically are higher quality that PSD baseline emissions data, and nothing precludes using higher quality data for short-term rates in modeling total concentrations for AQRV assessments; and (6) the uncertainty and accuracy of model predicted or estimated concentrations in NSR air quality impact assessments is typically unknown.

Our experience illustrates that available raw data, such as coal combusted and the coal's sulfur content, can be used, but not without some data uncertainty, for calculating emissions (sulfur dioxide) during our PSD baseline years (see, for example, Appendices D and E, Addendum B to our *SO2 PSD Air Quality Modeling Report*).

The preamble also requested comments on WESTAR's menu of calculation methods. WESTAR's menu provides examples of calculations methods; an EPA menu should not override (1) the proposed policy for the new definition of "actual emissions", which includes the standard that the emissions data used in increment modeling are reliable, consistent and representative, (2) or the use of actual emissions when actual emissions differ from the allowable level established in the permit (see 45FR at 52718, col.3). Any menu of calculation methods should not be so rigid as to suggest the same tier or hierarchy for both increment-consumption and AQRV assessments, since (1) increment consumption assessments require PSD baseline emissions (which can contain considerable uncertainty for some sources or source categories) and (2) AQRV assessments use only current-time emissions to determine current-time total concentrations.

72 FR 31390, § V.B.4: "Use of Allowable Emission Rates"

The preamble states:

> "We are modifying the language [of actual emissions] from the prior definition slightly to make it clear that we do not intend to mandate the use of allowable emissions, only to allow it at the discretion of the source or reviewing authority."

EPA did not mention a specific focus for comment on the issue. (Note – under the proposed new definition for "actual emissions", the issue would be 40 CFR 51.166(f)(1)(v), which is not mentioned in the preamble.)

We agree with the proposed clarification in use of allowable emissions when modeling for the following reasons: (1) the rule-defined "baseline concentration" reflects actual emissions; (2) use of allowable emissions for sources constructed after the major source baseline date can overstate actual air quality deterioration, since allowable emissions are typically higher than actual emissions (see, for example, section 8.9 in *Responses to Recurring Issues*); (3) use of allowable emissions for sources constructed before the major source baseline date rather than actual emissions at both time lines can indicate no air quality impact (deterioration or improvement); and (4) real increases or decreases in emissions are reflected in monitoring data and are increment consuming or expanding, respectively.

72 FR 31391, § V.B.5: "Emissions from a New or Modified Source"

The preamble states:

> "In reforms to the NSR program completed in 2002, we allowed modified sources to use projected actual emissions in calculating whether the [physical] change resulted in a significant net increase in emissions. See 67 FR 80290 (December 31, 2002). For the same reasons discussed in this rulemaking, we propose to adopt revised language for purposes of the increment assessment that requires the use of projected actual emissions."
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> "We propose to continue requiring the increment assessment to be based on the potential to emit of a new source that has not begun normal operations as of the date of the assessment."

EPA did not mention a specific focus for comments on this issue. (Note – under the proposed new definition for "actual emissions", the issue would be 40 CFR 51.166(f)(1)(vi), which is not mentioned in the preamble.)

We observe that the proposed change from potential-to-emit to projected actual emissions, for purposes of modeling increment consumption, improves consistency in review and analyses of proposed source modifications under the NSR program. We support the proposed change regarding use of "potential-to-emit" emissions.

72 FR 31391, § V.C.1: "Types of Meteorological Data and Processing"

Federal agency modelers regard MM5 data as appropriate input for Calmet in a variety of air quality applications and presumed that MM5 were also the data of choice for North Dakota's CAA SIP PSD periodic review. An industry consultant demonstrated that RUC data provide better agreement with NOAA/NWS surface and independent wind-energy wind tower meteorological wind measurements. For example, see section 5.2 in *Responses to Recurring Issues*.

The preamble states:

> "Recent experience suggests there may be a need for us to clarify the circumstances when it is permissible and appropriate to use meteorological data derived from prognostic meteorological models in dispersion model simulations such as a PSD increment consumption analysis." "Meteorological data may be considered adequate and appropriate for particular dispersion model or application, but that determination does not necessarily imply the adequacy and appropriateness of the data for other dispersion models or other applications of the same model."

See our comments to preamble sections V.C.3 and V.D.

Continuing, the preamble states:

> "In addition, ... diagnostic processors often can incorporate meteorological observation data into the process, resulting in a field of meteorological data that effectively blends the ground-truth of observations with the dynamics of the meteorological model."

We note that blending of meteorological observations with prognostic model data using a diagnostic processor may reduce rather than improve the accuracy of model domain wind fields, as explained by WindLogics, Inc. (see section 5.2 in *Responses to Recurring Issues* and *Comments on Upper Air Interpolation Shortcomings*, which is attachment 6 to tab B, volume 3 of Exhibit 95 in our hearings docket). We have completed the tests using RUC data, MM5 data and NOAA/NWS observations without RUC or MM5 data, which illustrate that blending the modeled data with NOAA/NWS observations does degrade modeled data accuracy (see sections 5.2, 5.4, 5.5 and 5.10 in *Responses to Recurring Issues*).

Continuing, the preamble states:

> "Meteorological data may be considered adequate and appropriate for a particular dispersion model or application, but that determination does not necessarily imply the adequacy and appropriateness of the data for other dispersion models or other applications of the same model. ... Appendix W lists specific factors to consider when determining whether or not a set of meteorological data is representative for a particular [steady-state] dispersion model application. These include the proximity of the meteorological monitoring site to the area of interest, the complexity of the terrain in the area, the exposure of the meteorological monitoring site, and the period of data collected."
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> "For long-range transport modeling assessments or assessments involving complex winds that require non-steady-state dispersion modeling appendix W allows, and in fact encourages, the use of prognostic mesoscale meteorological models to provide inputs data into dispersion model simulations. ... Appendix W further indicates the mesoscale meteorological fields should be used in conjunction with available NWS or comparable meteorological observations within and near the modeling domain."

We observe that Appendix W also indicates that consistency with this guidance "is not, however, promoted at the expense of model and data base accuracy" and "the diversity of the nation's topography and climate ... dictate against a strict modeling 'cookbook'."

We note that the RUC model assimilates each hour NWS and other meteorological observations; repeated assimilation of these observation by the diagnostic model Calmet would degrade the RUC data and add uncertainty to wind fields as input to Calpuff, as explained and cited below.

Continuing, the preamble states:

> "We propose that a determination of appropriateness would involve a process equal in vigor to that already used to review prognostic meteorological model output data for use in photochemical grid modeling applications at the regional scale. ... Currently, acceptable quality of meteorological inputs derived from prognostic meteorological models would be demonstrated by statistical comparison of the prognostic model output to observations for key meteorological parameters ..."

Apparently, you are referring to section 16.3 in your document *Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze*. In general, we concur that a determination of appropriateness provides important information. However, we note: (1) such determinations require significant resources and process time allowances, (2) the line of separation between appropriateness and inappropriateness is broad and requires skilled technical judgement, (3) section 16.3 does not provide a paradigm that characterizes appropriate and/or inappropriate meteorological data, and (4) uncertainty, error and bias in prognostic and diagnostic meteorological data confound error and bias in dispersion modeled concentrations.

Continuing, the preamble states:

> "It is important to emphasize that a statistical comparison of the meteorological observation data to output of the diagnostic process, or even of the prognostic meteorological models, can only be part of any determination of appropriateness. A phenomenological evaluation, a generally qualitative comparison focused on the specific meteorological phenomena of importance to a specific application, can be used together with the more quantitative comparisons of specific parameters to provide a more complete assessment of the representativeness of meteorological data."

See our comments to preamble section V.C.3.

Continuing, the preamble states:

> "Additional technical factors that may need to be considered in the determination of appropriateness include: [s]election of geographic domains and time periods; [i]nfluence of boundary and initial conditions; [t]echnical options governing the meteorological model calculations; and [d]ata assimilation parameters. ... We request comment on how these and other factors may be considered in a determination of appropriateness of meteorological data derived from prognostic meteorological models for use in dispersion modeling applications. ..."

Another factor in a determination of appropriateness is the manner in which meteorological data and information are assimilated into the prognostic calculations of the model. As explained by WindLogics, Inc., and others in the Department's hearings docket, the RUC model is superior to the MM5 model in assimilation of meteorological data and information and hourly forecast error correction. For example, "the RUC cycle is unique among the NCEP [and MM5] forecast systems in that analyses are produced every hour, versus every [three or] six hours for the other models used for longer term forecasting, ... The RUC cycle uses a process known as continuous assimilation, in which short, one-hour forecast segments are interspersed with applications of the data assimilation process. This means that each hour, the one-hour forecast fields are corrected, based on the real-time [observational] data collected by the National Oceanographic and Atmospheric Administration (NOAA). These corrected fields serve as the starting point for the CALMET analysis ..." See section 8.6 in *Responses to Recurring Issues*.

See also our comments to preamble section V.D.

Our experience and research indicates that three of the four technical factors listed in the preamble are not transparent to some users of RUC and MM5 data in air quality modeling. The RUC model is executed by NOAA, and the MM5 model is executed by a select group of individuals, agencies and consultants who make the needed choices in execution of the models. So an option for users of undocumented executions of a prognostic model is to determine appropriateness of the data through quantitative and/or qualitative comparison of the data with meteorological observations. See, for example, sections 5.2 and 8.6 in *Responses to Recurring Issues* and *Comments on Upper Air Interpolation Shortcomings*.

Continuing, the preamble also states:

> "To reduce the effect of ... assigned boundary conditions, we propose the area of interest be selected from an area substantially with in the model simulation domain, for example at least six grid cells from the boundary. We also propose to include in any review, a thorough description of the techniques used to extract data from a larger grid ..."

While we agree that the area of interest be within the model domain to reduce the effect of boundary conditions, six grid cells may not be necessary, since the domain and grid cell size of prognostic and diagnostic models can vary. An inverse solution seems appropriate as practiced in NDDH's modeling – the region of interest for the air quality modeling problem was selected and then the region of the prognostic or diagnostic model grid was set to be larger by several grid cells. Meteorological observations were not constrained to locations within the modeled domain, but included locations external to and bordering the model domain (see, for example, the figure on page 9 in Addendum B to ND's *SO2 PSD Air Quality Modeling Report*).

The preamble emphasizes statistical performance metrics comparing prognostic or diagnostic meteorological model output to meteorological observations but does not mention performance metrics comparing dispersion model output to ambient air quality observations. This emphasis creates an implicit, and rebuttable, presumption that dispersion models overcome the uncertainty and inaccuracy of input meteorological data and provide robust output; however, see, for example, paragraphs 9.1.1(a), 9.1.2(a) and 9.1.2(b) in Appendix W (70 FR 68246).

No new or modified regulation is proposed.

72 FR 31393, § V.C.2: "Years of Meteorological Data"

The preamble states:

> "With respect to prognostic meteorological data, appendix W states that for long-range modeling and for other assessments involving non-steady-state dispersion modeling to account for complex flows, less than 5, but at least 3, years of data from prognostic meteorological models may be used, and that the years need not be consecutive. ... We believe that our current guidance provides adequate discretion to the State to determine which and how many years (but no less than 3 years) should be used ..."
>
> "When a State is developing a set of data years for dispersion modeling, we propose to allow the State to consider any data years that it has determined to be appropriate

> using the process described above even if those data years were not produced by the exact meteorological model configuration and simulation."

We observe that the preamble fails to mention that model performance metrics, which compare modeled-concentrations to monitored concentrations, can only be determined by modeling current emissions with concurrent meteorology (see section 5.11 in *Responses to Recurring Issues*).

The preamble also states:

> "However, we also propose that the State must further determine that a particular set of data years can be modeled to produce an appropriate depiction of the air quality issue at hand."

We agree that a determination as to whether a particular set of meteorological data years produces an appropriate depiction of air quality requires several levels of model performance analyses. For example, (1) the prognostic model (RUC or MM5) output compared to actual meteorological observations, (2) the diagnostic model (Calmet) output compared to actual meteorological observations, and (3) the transport and dispersion model (Calpuff) output compared to actual observations through monitoring of air quality. The first and second level provide the performance metrics to determine that modeled outcome produces an appropriate depiction of model domain meteorology. Each model has its own technical algorithms, which contain uncertainty or inaccuracy (see, for example, paragraph 9.1.1(b) in Appendix W (70 FR 68246) and sections 5.1, 5.12, and 8.3 in *Responses to Recurring Issues*). However, the performance outcome of the third level depends on the performance outcome of the first and second levels. Omission of the third level assumes that the transport and dispersion model is reasonably robust and an adequate depiction of air quality depends only on an adequate depiction of model domain meteorology. But transport and dispersion models in tandem with meteorological models are poor at matching short-term actual observations (see, for example, sections 5.5 through 5.8 and 5.12 and Attachment B in *Responses to Recurring Issues*).

See also our comments regarding preamble section V.D.

EPA did not mention a specific focus for comments on this issue.

No new or modified regulation is proposed.

72 FR 31393, § V.C.3: "Evaluating the Appropriateness of Data Years from Prognostic Meteorological Models for Modeling Worst-Case Impacts"

In air quality modeling, we observe there has been no expression of the frequency of occurrence of the worst-case meteorology conducive for the worst-case concentration and no guiding principle regarding acceptable risk when modeling for under-estimating concentrations. For example, the worse-case meteorology is a single occurrence during the years of meteorological input data in the modeling scenario; or for the 24-hour averaging period – 1 in 1,095 days when using three years of data and 1 in 1,725 days when using five years of data; acceptable risk floats according to the conservative attitudes of modelers (see paragraph S4.3 on page xv in *Responses to Recurring Issues*). The discussion in this section of the preamble, and typically in other EPA modeling documents, advocates modeling meteorology representative of worst-case pollutant transport and dispersion without addressing time-variable emissions (see section 4.3 and figure A4 in *Responses to Recurring Issues*) and model algorithm accuracy.

The preamble states:

> "For applications in which the modeling approach is designed to model worst-case impacts, we propose that the State should determine whether or not a set of years is appropriate based upon meteorological/climatological representativeness, and additionally determine whether or not that set of years is appropriate to simulate the worst-case conditions required of the application. Keeping in mind worst-case conditions might not be discernable until simulated through a dispersion model, the term "worst-case" does not describe a set of worst-case meteorology, but rather a set of meteorology that when modeled, produces a worst-case depiction of air quality."
>
> "That a particular data set sufficiently represents the meteorological observations for a given area for a given time period, base upon statistical analyses, may not be proof enough to determine that the particular data set is most appropriate for a dispersion application, especially when conducting worst-case applications. While we do not explicitly propose a three-step process for determining appropriateness, these three examinations – appropriateness of the prognostic meteorological model output in general, appropriateness (meteorological representative) of the extracted data set, and appropriateness of the data set for the dispersion model application – are each a necessary part of the overall determination of appropriateness ..."

We note that the only known method of determining whether a meteorological data set of years is meteorologically/climatologically representative and appropriate to simulate worst-case conditions is to compare that set of years to a longer climatological record. Prognostic meteorological data sets are not available for climatological periods; and if they were, the burden of the suggested demonstration is onerous and unreasonable.

The meteorological phenomena of importance to a specific application (the phenomenological evaluation per V.C.1) can include, and likely includes, the meteorology which produces the worst-case air quality. The time periods of these meteorological phenomena are best determined with worst-case actual observations; there is no alternative objective method, since statistical analyses of meteorological observations to determine representativeness are not proof enough to determine that particular meteorological data are appropriate for a worst-case application. For example, section 5.7 in *Responses to Recurring Issues* and Appendix B to Addendum C to *North Dakota's SO2 PSD Air Quality Modeling Report*, which are your docket document numbers EPA-HQ-OAR-2006-0888-0011.14 and 0011.1, respectively.

Continuing, the preamble states:

> "We request comment on continuing the current path, based upon appendix W's guidance that previous years of meteorological data which have been used as the basis for permit emission limitations should be added to any subsequent period of meteorological data used in dispersion modeling. See 40 CFR part 51, appendix W, paragraph 8.3.1.2(c)."

We believe that previous years of prognostic and diagnostic meteorological data which have been used as the basis for permit emission limitations should not be used when that data was developed using old technology that is no longer supported or obsolete, such as MM4 data. Use of such data permeates the uncertainty and inaccuracy of that data into modeling results. And the use of such data with other current technology data also inhibits isolating or understanding the causes of modeled-concentration uncertainty and inaccuracy. So, we recommend that paragraph 8.3.1.2(c) in Appendix W be deleted.

Continuing, the preamble also states:

> "We will also accept comments on alternative methods for determining appropriate years of meteorological data including the use of data sets of processed observations, prognostic meteorological model output, or combinations of both."

Actual concentrations reflect actually emitted pollutants transported and dispersed by concurrent and subsequent meteorology. So, we conclude that one criterion for selecting appropriate years of meteorological data must reflect corresponding years of available actual concentrations from monitors. Several EPA publications, including Appendix W, clearly advocate comparing modeled concentrations to actual concentrations (see, for example, sections 3.5, 3.6 and 8.11 in *Responses to Recurring Issues*).

See also our comments related to preamble discussion V.C.1 and V.C.2.

No new or modified regulation is proposed.

72 FR 31393, § V.D: "What are my documentation and data and software availability requirements?"

The preamble in section V.C.1 recognizes three prognostic meteorological models. The data of two of those models have been used for a PSD periodic review of the status of PSD increment consumption in North Dakota – namely, MM5 and RUC models. We note that the MM5 model and the RUC model are not listed and described in Appendix W. We have observed that public use of these models, resources aside, is constrained or restricted: there is no public go-to user's manual for either model, there are no public go-to places to download model software, and there are no readily-available go-to places to download input data. The MM4 and MM5 data provided to us by EPA Region 8 and the FWS was received without any documentation. (And EPA Region 8 used MM5 data in its 2002-03 draft modeling without complete demonstrations of appropriateness as proposed in preamble section V.C.1.) Yet federal air quality modeling practitioners/over-sight reviewers regard MM5/Alpine-Geophysics or MM5/FWS as public-domain, public-reviewable model applications on the one hand and RUC/ADAS/WindLogics as unaccessible on the other. This dichotomy in their actions and opinions remains unexplained. The record for our periodic review hearings contains far more information pertaining to the RUC model than the MM5 model.

The preamble states:

> "Appendix W recommendations regarding documentation software availability for preferred modeling techniques include that the 'model and its code cannot be proprietary.'"
>
> "Application of the non-proprietary requirement to data developed for input into or use by a preferred model, or to other software used to process input data for a preferred model, is not explicitly addressed in appendix W."
>
> "In addition, proprietary software interfaces to simplify the setup and analysis of Appendix A models have been developed by several commercial vendors, and have been in common usage for more than a decade. Such commercial software interfaces have not been subjected to a requirement to make the proprietary code available to the public or the reviewing authority.
>
> "In the special case of proprietary data that may be used in the development of model inputs, we believe that it is currently within the discretion of the State to require some independent review of the proprietary data by an oversight agency, if such a review is deemed critical to the overall assessment of the appropriateness of data for a particular modeling application. Another option within the discretion of the State would be for the State itself to conduct the review ..."
>
> "In the case of software, the focus of the determination of acceptability by the reviewing authority should be on the adequacy of the technical documentation and the performance demonstrations that are required to support the use of such software. ..."

We concur with your conclusion that Appendix W does not contain a strict requirement that dispersion model input data and that software other than air quality dispersion models also be non-proprietary. We support your clarification of options of discretion available to us for assessing the appropriateness of the data and the adequacy of software. However, we hope that reviewing authorities' expectations of the scope of these assessments are reasonable.

> "We believe that the current text of appendix W adequately defines the documentation and software availability requirements related to both preferred and alternate modeling techniques. We request comment on whether additional guidance is needed to clarify these requirements as they apply to use of proprietary software

> and/or data to develop input for an Appendix A modeling application for PSD increment consumption."

We agree that additional guidance regarding proprietary software or data used to develop input for modeling is not necessary for the following reason; transparency in our actions is required by North Dakota law at NDCC 44-04-18 (details available at http://www.ag.nd.gov/Manuals/OROMManuals/OpenRecordsManual2006A.pdf), unless protected as confidential business information.

No new or modified regulation is proposed.

Supplemental Comments Regarding Modeling for Worst-case and Ambient Monitoring

The CAA contains provisions for ambient air quality monitoring at § 165(e)(2) and for air quality modeling at § 165(e)(3). In addition, an implementing-rule decision states that "Congress intended that monitoring would impose a certain discipline on the use of modeling techniques ..." and "[T]hat modeling techniques be held to earth by a continual process of confirmation and reassessment, a process that enhances confidence in modeling, as a means for realist projection of air quality" (see Alabama Power Co. v. Costle, 636 F.2d 323, 372 (D.C. Cir, 1979).

Actual concentrations reflect actually emitted pollutants transported and dispersed by concurrent meteorology; so uncertainty as to representativeness of modeled emissions with respect to actual concentrations is unknown without tests which compare modeled concentrations to actual concentrations (see, for example, sections 5.1 and 5.5 through 5.8 and Attachment B in *Responses to Recurring Issues*). However, modeling has generally been preferred to monitoring in spite of knowing that the modeled concentrations are biased; and positive normalized bias out to 1.0 (or the often quoted factor of two) has generally been tolerated without regard to implications in decision making and air quality management (see paragraphs S4 on pages xiv through xvi in *Responses to Recurring Issues*). For example, section 9 in Appendix W and section 18 in your document *Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze* do not discuss an action consequence when error or bias in modeled concentrations is unacceptable.

We observe that worst-case events are sought in modeling given the "not to be exceeded" language of the NAAQS and PSD increments. But technical algorithms in models and input data contain uncertainty and inaccuracy (see, for example, paragraph 9.1.1(a) and 9.1.1(b) in Appendix W (70 FR 68246)). Consequently, models are – at best – reasonably reliable for estimating the largest concentrations occurring sometime, somewhere within an area (see, for example, paragraph 9.1.2(a) in Appendix W, which does not cite studies that confirm this statement or that the statement applies everywhere). In North Dakota's PSD class I areas, error in modeled concentrations at the sites of monitors is less than or comparable to the range of highest modeled concentrations for a network of receptors; plumes sweep left or right and there are no studies to confirm that a single monitor would not capture the highest and largest short-term concentrations during a year (see section 6.4 in *Responses to Recurring Issues*). And modeled worst-case concentrations occur under meteorological, e.g., calm-wind, circumstances where model algorithms are known to be inadequate (see, for example, paragraphs 8.3.4.1 (calm winds in mesoscale modeling are not treated as missing) and 8.3.4.2(a&b) in Appendix W and sections 5.5, 5.7 and 5.9 in *Responses to Recurring Issues*).

Available actual ambient sulfur dioxide concentrations illustrated that modeling by the Department in 1999 and by EPA Region 8 in 2002-03 produced absurd estimates of CAA PSD sulfur dioxide short-term increment consumption, since those estimates were about double the actual concentrations. So the technology of Calmet and Calpuff modeling alone was inadequate to resolve for air quality management whether cumulative increment consumption exceeded the short-term increments (see, for example, paragraphs S3, S4, S5 and S6 on pages xi through xx and sections 5.12, 6.8 and 8.8 in *Responses to Recurring Issues*).